Syntactic Sensitivity of Movement, Ellipsis, and Scope:
Evidence from Discontinuous Coordination*

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1 Introduction

Among their many functions, the words both, either, and neither can mark the left edge of the first conjunct in a coordinate structure (a use I call “discontinuous coordination”):

(1)  
   a. Harvey plays both the saxophone and the accordion.  
   b. Harvey either sings opera or plays jazz.  
   c. Harvey neither likes jazz nor plays it.

However, even when serving this function, these particles (which I refer to collectively as C1) often appear further to the left than expected – that is, there is more material between C1 and the conjunction than there is between the conjunction and the right edge of the coordination:

(2)  
   a. Harvey plays both the saxophone and accordion.  
   b. Either Harvey sings opera or plays jazz.  
   c. Harvey neither likes jazz nor polka.

I will refer to constructions of this type as “unbalanced” coordinations in which C1 is “displaced” from its expected position.

Previous investigations of unbalanced coordinations (Larson 1985; Schwarz 1999; Han and Romero 2004; Hendriks 2004; den Dikken 2006) have often focused on either to the

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exclusion of both and neither and have offered conflicting grammaticality judgments. The
goal of this study is to investigate the properties of unbalanced discontinuous coordination
(including semantic factors), informed by the results of a corpus study of the construction
(Kaplan 2007).

The main conclusion is that there are three very different processes at work in the licens-
ing of these constructions: movement of C1 (or possibly base-generation of C1 in a range of
positions, subject to locality restrictions), ellipsis in the second conjunct, and scope ambi-
guities with respect to the coordination. Somewhat surprisingly, all three of these processes
are sensitive to very similar types of syntactic configurations (including finite tense, islands,
and negation) that are known to constrain movement. Since the phenomena that fall out of
the latter two processes are demonstrably not the result of movement, and since the status
of the former as genuine movement is questionable, we must conclude that movement is not
the only kind of syntactic relation that is sensitive to islands, and that the sensitivity of
some phenomenon to islands does not entail that the phenomenon is the result of movement.

2 Syntactic Properties of C1

In this section, I identify the most important syntactic restrictions on the distribution of
displaced C1. In §2.1, I investigate the nature of this displacement; in §2.2, I identify the
constraints on the position of C1 and on how far it can be displaced.

2.1 Movement or Ellipsis?

There are two strands of analysis in the literature with respect to the nature of the displace-
ment of C1 in sentences like those in (2). On one account (Larson 1985; den Dikken 2006),
C1 moves from its base-generated position at the left edge of the first conjunct, resulting in
a structure like that illustrated in (3)\textsuperscript{1}:

(3) Harvey either\textsubscript{i} likes [ t\textsubscript{i} jazz or polka ] .

On another account (Schwarz 1999), some type of ellipsis\textsuperscript{2} occurs in the second coordinate,
resulting only in the appearance of left-displacement of C1:


In fact, there is evidence for the surprising conclusion that both accounts are right, but
for different constructions: ellipsis is the appropriate model for left-displacement involving
DPs, while movement is the appropriate model for clauses\textsuperscript{3}. §2.1.1 – §2.1.2 present syntactic

\textsuperscript{1}For den Dikken, C1 is actually base-generated in its displaced position. For the purposes of this section,
this is equivalent to the movement analysis (as opposed to the ellipsis analysis); see §2.1.5 for evidence that
the base-generation approach is in fact correct.

\textsuperscript{2}See §2.1.6 for discussion of exactly what type of ellipsis is involved.

\textsuperscript{3}Others, including Han and Romero (2004) and Hofmeister (2007), have proposed that displacement of
C1 requires reference to both mechanisms, but none make the distinction proposed here.
evidence for this conclusion; §2.1.3 and §2.1.4 present semantic evidence.

2.1.1 What Is Actually Coordinated?

These two accounts differ with respect to the constituents that they posit as being underlyingly coordinated in unbalanced structures. For example, in a structure like (5), the ellipsis account posits underlyingly coordinated DPs, while the movement account posits coordinated NPs:

(5) either the saxophone or accordion
   a. \[ \text{DP} \text{either} \{ \text{DP the saxophone} \} \text{or} \{ \text{DP the accordion} \} \]
   b. \[ \text{NP} t_i \{ \text{NP saxophone} \} \text{or} \{ \text{NP accordion} \} \]

Similarly, in a structure like (6), the ellipsis account once again posits underlyingly coordinated DPs (with accompanying right-node raising), while the movement account posits coordinated APs (or DegPs):

(6) either the tenor or alto saxophone
   a. \[ \text{DP} \text{either} \{ \text{DP the tenor} t_i \} \text{or} \{ \text{DP the alto} t_i \} \text{saxophone}_i \]
   b. \[ \text{AP} t_i \{ \text{AP tenor} \} \text{or} \{ \text{AP alto} \} \text{saxophone}_i \]

The base-generated version of (5b), however, is ungrammatical (see also Hendriks (2004, 5, 22-23); Huddleston and Pullum (2002)):

(7) * the either saxophone or accordion

Similarly, the base-generated version of (6b) also seems to be ungrammatical:

(8) *? the either tenor or alto saxophone

As noted by Huddleston and Pullum (2002, 1306), constructions like (8) may in fact be marginally acceptable; they cite examples like (9):

(9) It was clearly an \[ \text{AP} \text{either} \{ \text{AP misinformed} \} \text{or} \{ \text{AP clearly malicious} \} \] suggestion.

It is possible that the restriction on discontinuous coordination of prenominal modifiers is simply a special case of the dispreference in English for “heavy” syntactic elements in that position. Even so, the difference between (6) and (8) is striking, and the Treebank corpus contains not a single example in which discontinuous coordination applies unambiguously to a prenominal modifier (i.e., in which the entire coordination occurs after an overt determiner; Kaplan (2007)). In addition, to the extent that (8) is grammatical, it does not mean the

\[ ^4 \text{We know from other examples (without displaced C1) that RNR in such structures is allowed; examples like (i) are abundant in the Treebank corpus:} \]

(i) This is not a mutually exclusive plan; there is no one point in a man’s career at which he must select \[ \text{either} \{ \text{the technical} t_i \} \text{or} \{ \text{the managerial} t_i \} \text{[ path upwards]} \] . (Marcus et al. 1999, ce32.pos)
same thing as (6): (6) refers to two saxophones of different kinds, while (8) refers to a single saxophone whose exact nature is undetermined.

It is clear, then, that the underlying structures posited by the movement account do not otherwise surface as grammatical. To say that NPs and prenominal APs may be coordinated only if C1 surfaces further to the left seems inelegant (not to mention difficult to implement); it is much simpler to prohibit discontinuous coordination of these categories altogether and propose that examples like (5) and (6) are the result of ellipsis rather than movement.

Clauses do not exhibit the same problem; the “unmoved” versions of (10a) – (10e) are just fine:

(10) a. Harvey either likes jazz or polka. (DPs)
   (i) Harvey either \( t_i \) likes [DP \( t_i \) [DP jazz ] or [DP polka ] ] .
   (ii) (cf. Harvey likes either jazz or polka.)

b. Harvey either likes to dance or sing. (VPs)
   (i) Harvey either \( t_i \) likes to [VP \( t_i \) [VP dance ] or [VP sing ] ] .
   (ii) (cf. Harvey likes either dance or sing.)

c. Either Harvey is talented or incompetent. (predicate APs)
   (i) Either \( t_i \) Harvey is [AP \( t_i \) [AP talented ] or [AP incompetent ] ] .
   (ii) (cf. Harvey is either talented or incompetent.)

de. Harvey either sang at the park or in the restaurant. (PPs)
   (i) Harvey either \( t_i \) sang [PP \( t_i \) [PP at the park ] or [PP in the restaurant ] ] .
   (ii) (cf. Harvey sang either at the park or in the restaurant.)

e. Harvey either thinks that the accordion is the most beautiful instrument or the kazoo is. (IPs)
   (i) Harvey either \( t_i \) thinks that [IP \( t_i \) [IP the accordion is the most beautiful instrument ] or [IP the kazoo is ] ] .
   (ii) (cf. Harvey thinks that either the accordion is the most beautiful instrument or the kazoo is.)

Since various subconstituents of CPs may be freely coordinated, there is no conceptual difficulty to positing left-displacement in these cases.

2.1.2 Right-Displacement of C1

A second piece of syntactic evidence for the distinction between clauses and DPs comes from the fact that displacement of C1 is not exclusively to the left; sometimes C1 occurs unexpectedly far to the right:

(11) [ Harvey either likes jazz ] or [ he likes polka ] .

Examples like (11) are extremely common. As acknowledged by den Dikken (2006, 697) and Schwarz (1999, 340), ellipsis processes are structurally incapable of deriving such sentences; there is simply nothing missing from (11). Since an analysis of (11) in terms of ellipsis is

5See §2.1.3 and §3 for discussion of the interpretation of sentences like these.
therefore unavailable, a movement account immediately suggests itself; this in turn suggests that movement may be responsible for left-displacement of C1 in clauses as well.

But although right-displacement of either is common in clauses, it is impossible into DPs:

\[(12)\]  
\[\ast\] Harvey plays \([\text{DP } t_i \text{ DP } \text{the either}_i \text{ saxophone }] \) or \([\text{the accordion }] \). 

If movement of C1 across a DP boundary is simply forbidden outright, the ungrammaticality of (12) follows automatically.

2.1.3 Scope of Coordination

There is semantic as well as syntactic evidence for a distinction between C1-displacement in clauses and DPs. The first piece of semantic evidence comes from the “scope” of coordination. Although a full discussion of scope and coordinate structures must be postponed until §3 (including a justification of the treatment of these semantic facts as involving scope differences), (13) provides a working diagnostic for determining how far “up the tree” coordination scopes:

\[(13)\]  
**Scope of Coordination Relative to Intensional Operators**

Given a structure \([ X [ Y \text{ Conj } Z ] ]\), coordination scopes over X if the structure has the reading \([ [ X Y ] \text{ Conj } [ X Z ] ]\), and this reading differs truth-conditionally from (some reading of) \([ X [ Y \text{ Conj } Z ] ]\). If the structure does not have this latter reading, coordination scopes under X.

The ellipsis account predicts that the scope of coordination will always be at least as high as left-displaced C1, since all the relevant structure is actually present underlyingly. Semantic phenomena along these lines were in fact the original motivation for the operation of “Conjunction Reduction” (Lakoff and Peters 1969): the fact that (14a) is truth-conditionally equivalent to (14b), while (15a) is not truth-conditionally equivalent to (15b), has been attributed to an underlying structure for (14a) that involves full clauses.

\[(14)\]  
a. John and Mary sang.  
b. John sang and Mary sang.

\[(15)\]  
a. John and Mary agreed.

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6Treebank contains two possible exceptions:

\[(i)\]  
I mean I have met \([\text{DP } t_i \text{ DP } \text{people that, uh, both, that, that just want to maintain a, the standard of living }] \) and \([\text{DP } \text{those that, that really need the job } ]\). (Marcus et al. 1999, sw4360.pos)

\[(ii)\]  
But you know, you can counsel a kid eight hours a day and then he goes home and, and, uh, you know, in the, in worst cases he’s got \([\text{DP } t_i \text{ DP } \text{parents either, on drugs }] \) or, or \([\text{DP } \text{something like that } ]\). (Marcus et al. 1999, sw2744.pos)

The multiple disfluencies suggest that these are performance errors; in addition, (ii) has an alternative analysis in which something like that is coordinated with (on) drugs rather than parents on drugs.
b. John agreed and Mary agreed.

However, in the Treebank corpus we find naturally-occurring examples of coordination scoping below left-displaced C1; note that these examples contradict the claim of Larson (1985) that the position of left-displaced either correlates with the scope of disjunction:

(16) I either want to do it in the fall or spring.
(Marcus et al. 1999, sw2248.pos)
   a. # I [VP either [VP want to do it in the fall ] or [VP want to do it in the spring ] ]
      (...and my therapist is helping me figure out which).
   b. I eitheri want to do it in [DP t i [DP the fall ] or [DP the spring ] ] .

(17) First City said that it either had to expand its holdings or sell them.
(Marcus et al. 1999, wsj_1791.pos, modified)
   a. # First City said that it [VP either [VP had to expand its holdings ] or [VP had to sell them ] ] (...and soon the board of directors would tell them which).
   b. First City said that it eitheri had to [VP t i [VP expand its holdings ] or [VP sell them ] ] .

The speaker of (16) is not unsure of his or her desires; rather, the speaker has a single want but is indifferent as to when the desired event takes place. Similarly, the company mentioned in (17) is not anticipating being subjected to one of two possible requirements; rather, First City is required to satisfy one of the alternatives given, but may choose between them itself. The structures posited by the ellipsis account (illustrated in (16a) and (17a)) cannot derive the appropriate meanings for these sentences; only the movement account can.

These facts are confounded somewhat by the fact that it is not entirely infelicitous to express the meaning intended in (16) with an utterance like (18):

(18) I either want to do it in the fall, or I want to do it in the spring – I don’t really care which.

It may be a special property of want that even two disjoined clauses expressing someone’s wants may be taken to express a disjunctive wish; if so, perhaps we cannot rule out ellipsis in sentences like (16). However, the same does not seem to be true of disjoined sentences with think, and yet either can appear to the left of think without requiring that disjunction have high scope:

(19) a. I either think we will lose in a close game or we will completely blow them out...[Writer goes on to describe what would cause each scenario to come about.]
   b. #I either think we will lose in a close game, or I think we will completely blow them out.

Thanks to Pranav Anand (p.c.) for this observation.
Nor is this phenomenon specific to Neg-raising verbs, of which want and think are two: have to is not a Neg-raising verb, yet (17) shows that it similarly may occur between left-displaced C1 and the scope of coordination. It seems, then, that no particular constellation of properties is responsible for the array of facts just seen; the scope of coordination and the position of C1 are truly independent.

When left-displaced C1 is at the edge of a DP, however, coordination can never scope lower:

(20) In addition, Courtaulds said the moves are logical because they will allow both the chemicals and textile businesses to focus more closely on core activities.
   a. ... [DP both [DP the chemicals \( t_i \)] and [DP the textile \( t_i \)] businesses,] ...
   b. \# ... both\( t_i \) the [DP \( t_i \) [DP chemicals] and [DP textile]] businesses...

(20) refers to two kinds of businesses, one kind that works in chemicals and one that works in textiles; the ellipsis analysis, illustrated in (20a), derives this meaning. It cannot refer to a single class of businesses, those that deal with both chemicals and textiles; this is the meaning derived by the movement analysis, illustrated in (20b). These facts are not limited to cases involving prenominal modifiers (where discontinuous coordination is independently disallowed); the same facts hold for postnominal adjuncts:

(21) ...both the businesses in chemicals and textiles...
   a. [DP ... both [DP the businesses in chemicals] and [DP the businesses in textiles]] ...
   b. \# ... both\( t_i \) the businesses in [DP \( t_i \) [DP chemicals] and [DP textiles]] ...

The facts for (21) are the same as those for (20); two kinds of businesses must be involved. (22), where C1 appears on the surface lower down in the structure, does have the low-scope reading.

(22) ...the businesses in [DP both [DP chemicals] and [DP textiles]] ...

Interestingly, DPs seem to exhibit behavior similar to that of want; it is possible for conjoined singular DPs to refer to a single individual (“appositional conjunction”):

(23) My great opponent and the hero of my youth has passed away. (Hoeksema 1988, ex. (21a))

If it were the case that the “low-scope” interpretation of (18) were responsible for coordination scoping below C1 despite the presence of the additional structure entailed by ellipsis, we would expect similar facts to be true of DPs, where we have independent evidence that ellipsis is involved. The fact that low-scope interpretations of sentences like (20) are impossible, despite the possibility of (23), suggests that whatever the appropriate analysis of (18) is, the relevant mechanism is ultimately independent of the scopal behavior of coordination.

Thus, where the ellipsis approach was too restrictive with respect to the readings that it allowed in clauses, the movement approach is too permissive, predicting low-scope readings in
DPs that are not actually available. It seems that ellipsis, not movement, is the appropriate way to understand unbalanced coordinations in DPs.

### 2.1.4 De Se and De Re

The second piece of semantic evidence for the distinction between clauses and DPs has to do with the distinction between *de se* and *de re* (Cresswell and von Stechow 1982; von Stechow 1982; Anand 2006). A sentence like (24) has two different interpretations, even when *John* and *he* corefer:

\[(24) \quad \text{John_i thinks he_i will win the election.} \]

- a. John thinks, “I will win the election.” (*de se*)
- b. John thinks, “That guy will win the election,” not knowing that “that guy” is actually himself. (*de re*)

The *de se* reading, given in (24a), arises when John’s belief is about himself and he realizes this. The *de re* reading, given in (24b), arises when John’s belief is about some individual (perhaps seen in a mirror or a picture) who, unbeknownst to John, is actually himself. This latter reading can be facilitated by following (24) with “…although he doesn’t know it.”

Interestingly, ellipsis does not require identity with respect to the *de se/de re* distinction.

The following scenario demonstrates this for VP Ellipsis:

\[(25) \quad \text{John is running for office. On election night, he goes to a local bar to watch the election returns. The news airs a debate John participated in earlier that day, but John is so drunk that he doesn’t recognize himself on television. He’s very impressed with his performance in the debate and thinks, “That guy will win the election!” Bill, John’s opponent, is in the same bar but has drunk far less than John. Bill thinks, “Surely a drunken lout like John will never get elected. I’m going to win the election.”} \]

- a. John thinks he_{de re} will win the election, and Bill does think he_{de re} will win the election, too.

(25a) can be used to describe the scenario given in (25) (assuming that the listener is already appropriately informed of the situation), despite the fact that (at least some of) the structure involved in the interpretation with respect to *de se/de re* appears only once on the surface. It is crucial that (25a) involves what Hankamer and Sag (1976) call “surface anaphora” (that is, identical structure in each coordinate underlingly) rather than “deep anaphora”, illustrated in (26), in which only one instance of the relevant structure is present at any stage of the derivation.

\[(26) \quad \# \text{John believes he}_{de re} \text{ will win the election, and Bill believes it too.} \]

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\[\text{8} \quad \text{For convenience, I will indicate the different readings with a subscript on the relevant pronoun; this does not represent any claim with respect to the formal representation of the distinction.} \]

\[\text{9} \quad \text{Similar observations are made in Chierchia (1989, 11, 18-23) and Reinhart (1990, 3-4).} \]
Similarly, Gapping allows “mixed” de se/de re readings:

(27) A television network executive enters the scene described in (25) and explains to John and Bill that footage from the debate is going to be aired in a country where it is considered indecent for a man to show his left ear in public. She says that the network plans to “black out” the offending body parts before re-airing the debate but has not yet decided what shapes to superimpose on the candidates’ ears. Bill quickly requests that his own ear be obscured with a square. John immediately adds, “And that other guy would look great with a triangle over his ear!”

a. John wants a triangle over his de re ear, and Bill wants a square over his de se ear.

The type of mixed reading available in (25a) and (27a), then, can be used to test for the presence of ellipsis. Where such mixed readings are available, they indicate the presence of multiple instances of the relevant structures underlyingly; where they are absent, they indicate at most as much underlying structure as actually appears on the surface (and therefore no ellipsis).

The following scenario allows us to test for ellipsis in clauses:

(28) John is the candidate from the scenario in (25). Luckily, he isn’t so drunk that he’s forgotten the happy fact that he is engaged to Pamela Anderson.

a. # John both de re thinks he will [VP t_i [VP win the election] and [VP marry Pamela Anderson]].

b. * John [IP both [IP thinks he de re will win the election] and [IP thinks he de se will marry Pamela Anderson]].

It is impossible to describe this situation with the sentence John both thinks he will win the election and marry Pamela Anderson. As illustrated in (28a) and (28b), the only available reading for this sentence is the one derived via the movement analysis (sketched in (28a)) but inconsistent with the scenario of (28); the desired mixed reading, which requires ellipsis, is not available, suggesting that the structure sketched in (28b) is actually disallowed.

In the scenario given in (28), John presumably has the thought, “I won’t win the election” (since he believes of the charismatic man on TV that he will win). At first glance this fact might seem to be interfering with the availability of the desired mixed reading of the relevant sentence; however, even in a scenario in which John in fact remains agnostic as to whether he himself will win the election, the facts remain the same:

(29) John is the candidate from the scenario in (25), but he isn’t drunk. As he watches television in the bar, the local news displays some preliminary election returns. The television is far enough away that John can see (on a bar graph, for instance) that one candidate is far ahead, but he can’t read the names of the candidates and thus doesn’t know which candidate it is. John thinks, “That guy will definitely win, whoever he is.” Having had a few beers, John is feeling mellow and thinks, “Well, whatever happens, at least I get to marry Pamela Anderson.”
It is still impossible to describe the situation in (29) with the sentence *John both thinks he will win the election and marry Pamela Anderson*, despite the fact that for all John knows, he may in fact win the election.

For DPs, the story is entirely different; it is perfectly possible to get mixed readings of indexicals where only one relevant element actually appears on the surface. The following scenario is illustrative:

(30) In addition to admiring his performance in the debate described in (25), John admires his fashion sense, saying, “That guy’s tie is really sharp!” A few minutes later, John catches a glimpse of himself in the bathroom mirror and thinks, “This shirt looks really good on me.”

a. # John thinks both his de re [NP tie] and [NP shirt] are becoming.

b. John thinks [DP both [DP his de re tie] and [DP his de se shirt]] are becoming.

The mixed reading, where John’s thought is about a shirt that he knows he himself looks good in and a tie that he doesn’t, is perfectly possible. This reading requires a structure with ellipsis, as illustrated in (30b); otherwise only one instance of the relevant structure and only one kind of interpretation (either de se or de re) would be available (as illustrated in (30a)).

2.1.5 What Type of Movement?

We have seen that unbalanced discontinuous coordination seems to arise differently in clauses and DPs: in clauses, it is the result of movement, while in DPs, it is the result of ellipsis. Two questions arise immediately:

1. What kind of movement is involved?

2. What kind of ellipsis is involved?

This section is devoted to question 1; §2.1.6 is devoted to question 2.

Some of the literature (for example, den Dikken (2006)) actually offers a third alternative to the movement-or-ellipsis distinction: that C1 is simply base-generated in its surface position, subject to locality constraints on how far away from the left edge of the first conjunct it can surface. The tests in §2.1.1 – §2.1.4 are sensitive only to the presence or absence of unrealized underlying material in the second conjunct; therefore, they do not distinguish between the movement and base-generation approaches.

In fact, similar phenomena involving comparatives offer evidence that the base-generation approach is the correct one. Consider a sentence like (31):

(31) Harvey is more excited about jazz than polka.

10Similar effects can be seen even in the absence of an overt *both*; this fact suggests that, contra Heycock and Zamparelli (2000), ellipsis may in fact be involved in “split” readings of apparent NP conjunction.
(31) seems “unbalanced” in a way reminiscent of sentences like *Harvey is either excited about jazz or polka*. However, there are four arguments against a movement analysis of (31) along the lines of (32):

(32) Harvey is more excited about jazz than polka.

1. To the extent that the base-generated form of (32) (*Harvey is excited about more jazz than polka*) is grammatical, it does not mean the same thing as (31): it means that Harvey is excited about a preponderance of jazz relative to polka in some situation, while (31) means that the degree to which Harvey is excited about jazz exceeds the degree to which he is excited about polka.

2. If *more* moves in sentences like (31), then the comparative affix *-er* moves in the same way in sentences like (33)\(^\text{11}\):

(33) Harvey is happier about jazz than polka.

3. The surface position of *more* is highly restricted (it must appear before an adjective, mass noun, or plural count noun). Since these appear to be positions of selection, it would seem most appropriate to hold that *more* is base-generated in these positions (the underlying representation being the area of the grammar where selection relations are generally supposed to hold) rather than constraining where *more* may appear in the surface structure.

4. In Greek, the comparative agrees with the compared nominals when it surfaces prenominally as in (34a), but not when it surfaces preverbally as in (34b)\(^\text{12}\). It is not clear why movement should result in this morphological difference.

(34) a. Ο Γιάννης διαβάζει πολλά/*πολλα* vivlia
the Giannis reads *many.NEUT.PL/*many.NEUT.SG book.NEUT.PL
apoti efimerides.
than newspaper.FEM.PL
‘Giannis reads more books than newspapers.’

b. Ο Γιάννης pjo *polla/*poli διαβάζει vivlia
the Giannis *many.NEUT.PL/*many.NEUT.SG reads book.NEUT.PL
apoti efimerides.
than newspaper.FEM.PL
‘Giannis reads more books than newspapers.’

An ellipsis analysis of unbalanced *more...than...* comparatives is no more plausible than the movement analysis. Most tellingly, these constructions can also turn up at the clausal level:

\(^{11}\)Thanks to Sandy Chung (p.c.) for this observation.

\(^{12}\)Thanks to Jason Merchant (p.c.) for these examples.
(35) Harvey is more confident that Joe will sing than dance.

However, we have already seen that ellipsis is excluded from clauses in the case of unbalanced discontinuous coordination. If unbalanced comparatives were really the result of ellipsis, they should be restricted to DPs and possibly other non-clausal categories (such as PPs and APs). In addition, mixed $de$ $se/de$ $re$ readings are not possible in unbalanced comparatives:

(36) John, the candidate from the scenario in (25), decides after several beers to propose to his girlfriend, Pamela Anderson. He knows she cares for him, but unfortunately, he is nervous and isn’t sure how she will respond.

a. #John is more$_i$ certain that he$_{de$ $re}$ will [$VP$ $t_i$ [$VP$ win the election ]] than [$VP$ marry Pamela Anderson ]] .

b. *John is [$AP$ more [$AP$ certain that he$_{de$ $re}$ will win the election ]] than [$AP$ certain that he$_{de$ $se}$ will marry Pamela Anderson ]] .

It is not possible to describe the scenario given in (36) (in which one of John’s beliefs is $de$ $re$ and the other is $de$ $se$) with the sentence $John$ is more$_i$ certain that he will win the election than marry Pamela Anderson; thus, ellipsis cannot be the explanation for unbalanced comparative structures.

If neither movement nor ellipsis is a plausible account for the genesis of unbalanced comparatives, the only remaining alternative is that more is always base-generated in its surface position, subject to locality restrictions constraining how far from the smaller phrases linked by than it can appear. The result would be a structure like the following:

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13 The structure sketched here glosses over the precise syntax of comparatives, especially the issue of DegPs.

14 As Lechner (2001) demonstrates, certain ellipsis processes such as Gapping may in fact apply to comparative constructions, just as they may apply to full coordinated clauses. It is possible that some “unbalanced” comparative structures (including some phrasal comparatives) may be derived via Gapping, but this cannot be the whole story. See §2.1.6 for a discussion of the nature of the type of ellipsis process required to produce unbalanced coordinate structures and comparatives.
The structure in (37) immediately raises two questions. The first (and more difficult) question has to do with the location of than polka. Although there is no consensus on the proper attachment site for than-clauses (and -phrases), than polka is almost certainly located higher than indicated here (Rullmann 1995; Kennedy 1999). For expository purposes, however, I will adopt (37) as a working assumption, for reasons explained below.

The second question raised by (37) has to do with how it can allow a compositional semantics to derive the appropriate meaning for Harvey is more excited about jazz than polka. The main obstacle to a straightforward analysis is that the pivot and the standard, excited about jazz and excited about polka, “share” a great deal of syntactic structure, which must somehow be used to compute two separate properties in the semantics.\(^{15}\) In §3, I will suggest that it is appropriate to compute the meanings of coordinate structures with a Hamblin semantics involving alternative sets; a similar approach is possible for comparatives and will be illustrated at that point.

Since unbalanced comparatives and unbalanced discontinuous coordinations exhibit similar properties (see also Lechner (2001)), it is reasonable to suppose that they reflect the same mechanism; the evidence from unbalanced comparatives suggests that this mechanism is one of locality restrictions on the base-generated position of the comparative/C1 rather than one of movement. We will see in §2.2 that if this is in fact the right analysis, the locality

\(^{15}\) Essentially the same problem arises if than polka is attached to some higher constituent such as Deg. Given such a structure, we would have to complicate the semantics of than in order to enable it to locate in the structure to which it is adjoined the entity being compared (jazz) and abstract over it so that it can compose the denotation of excited about polka in addition to that of excited about jazz.
restrictions on C1 are very similar to those often placed on movement. In the meanwhile, I will refer to this non-elliptical mechanism as one of long-distance dependency.

2.1.6 What Type of Ellipsis?

Hankamer (1979) distinguishes between two major types of ellipsis processes:

1. Processes that eliminate a constituent, leaving everything else behind (e.g., VP Ellipsis, NP Ellipsis)

2. Processes that leave behind one or more constituents, eliminating everything else (e.g., Gapping, Stripping, Sluicing, on some accounts)

The type of ellipsis needed for unbalanced discontinuous coordination is clearly of the latter type; the material left behind by this process is some constituent (which, incidently, must be final), while everything else is eliminated.

Schwarz (1999) and Lechner (2001) have attempted to reduce unbalanced coordinate structures and comparatives, respectively, to Gapping (although the latter focuses on phrasal comparatives and does not deal with precisely the kind of structures at issue here). However, this approach faces a number of serious difficulties. First, as we have seen, the type of ellipsis at work in unbalanced discontinuous coordinations does not apply to clauses, while Gapping applies to both clauses and DPs. Second, the salient characteristic of Gapping is that it leaves behind two (for some speakers, two or three) remnants, the first of which precedes the elided material and the second of which follows it:

(38) a. [IP Either [IP Harvey likes jazz ] or [IP Dean likes polka ] ] .
   b. Harvey protested [DP either [DP Dean’s review of his concert ] or [DP Lester’s review of his CD ] ] .

In unbalanced coordinate structures, on the other hand, what is left behind is one constituent:

(39) Harvey protested [DP either [DP Dean’s review of his concert ] or [DP Dean’s review of his CD ] ] .

Schwarz (1999, 354) argues that gapping can in fact leave behind a single constituent, producing the structures known as “split coordinations”:

(40) Harvey played jazz at the concert, and polka.

However, assimilating structures like (40) to Gapping seems even less plausible than assimilating unbalanced coordinate structures; not only does (40) require a special prosodic break

---

16In addition, Gapping in this DP may not leave behind less than the full PP of his CD, unlike the process in question here; c.f. *either Dean’s review of his concert or Lester’s review of his CD. Thanks to Masaya Yoshida (p.c.) for this observation.
before the second conjunct (not required in either (38a) or (38b)), but the mixed de se/de re test does not indicate that the proposed elided structure is actually present in (40). For example, given the scenario from (28), in which John’s thoughts are de re with respect to winning the election but de se with respect to marrying Pamela Anderson, it is impossible to utter (41):

(41) * [IP [IP John thinks the voters love him_{de re}, ] and [IP John thinks that Pamela Anderson loves him_{de se} ] ]

Since the process at work in unbalanced coordinate structures is not Gapping and cannot be assimilated to any other ellipsis process of the appropriate type, it must be a “new” (rather, previously undescribed) member of the second family of ellipsis processes. For lack of a better term, I will call it Conjunction Reduction (Lakoff and Peters 1969) after what, to my knowledge, is its closest analogue in the literature. Of course, this new ellipsis process is different in important ways from phenomena that previously went by the same name, most saliently in that, as we have seen, it does not apply to clauses. It is worthwhile to develop a preliminary sketch of what the restrictions on Conjunction Reduction are.

First, Conjunction Reduction apparently targets a constituent in some domain and eliminates everything else in that domain. The remaining constituent must be final; otherwise, ungrammaticality results:

(42) a. [DP either [DP the song about love ] or [DP the song about flowers ] ]
   b. * [DP either [DP the song about love on the album ] or [DP the song about flowers on the album ] ]

Schematically, then, Conjunction Reduction looks something like this:

(43) [D ... α ... [T ... β ... ] ] \( \Rightarrow \text{cr} \) [D ... α ... [T ... β ... ] ]

where D is the domain of Conjunction Reduction and T is its target

When I speak of Conjunction Reduction as “applying to” some constituent, I mean that it takes that constituent as its domain.

Second, we have seen that Conjunction Reduction does not apply to clauses, a notion that remains to be made more precise. Sentences like (28b), repeated below as (44), demonstrate that Conjunction Reduction cannot take an IP as its domain:

(44) * John both_{t_i} thinks [IP t_i [IP he_{de re} will win the election ] and [IP he_{de se} will marry Pamela Anderson ] ]

Similarly, (45) demonstrates that Conjunction Reduction cannot take a CP as its domain:

(45) * John thinks [CP both [CP that he_{de re} will win the election ] and [CP that he_{de se} will marry Pamela Anderson ] ]

On the other hand, sentences like (30b) (repeated below as (46)) show that Conjunction Reduction does apply to DPs.
(46) John thinks \([\text{DP both [DP his}_{de re} \text{ tie }] \text{ and [DP his}_{de se} \text{ shirt }] }] \) are becoming.

Unfortunately, it is difficult or impossible to apply the \(de se/de re\) test to other categories, since it depends on the ability of a third-person indexical to occur initially in that category. Without the relevant indexicals, the test simply does not apply, and if the relevant indexical does not occur initially, it is always possible to analyze the structure as involving Conjunction Reduction at a lower level plus leftward movement of C1:

\[
\begin{align*}
\alpha \\
C1 \\
\beta \\
\bar{\beta} \\
\bar{\gamma} \\
\text{indexical} \\
\delta \\
\epsilon \\
C2 \\
\zeta
\end{align*}
\]

can be analyzed as

\[
\begin{align*}
\alpha \\
C1_i \\
\beta \\
\bar{\beta} \\
\bar{\gamma} \\
\gamma \\
\epsilon \\
C2 \\
\zeta
\end{align*}
\]

rather than

\[
\begin{align*}
\alpha \\
C1 \\
\beta \\
\bar{\beta} \\
\gamma \\
\delta \\
\epsilon \\
C2 \\
\zeta
\end{align*}
\]

Since the only category to which Conjunction Reduction can be demonstrably shown to apply is that of DPs, I will adopt the working assumption that Conjunction Reduction only applies to DPs.
The following array of examples (all taken from the Treebank corpus) illustrates the range of material that Conjunction Reduction may eliminate from DPs:

(48)  

a. D
Now he saw that [DP both [DP the man ] and [DP the woman ] ] were moving slowly and irregularly...
Marcus et al. (1999, cn01.pos)
b. D, A
Religion is vitally important in [DP both [DP societal maintenance ] and [DP societal regulation ] ] .
Marcus et al. (1999, cj23.pos)
c. D, N
And bothi in [DP ti [DP their objectives of non-discrimination ] and [DP their objectives of social progress ] ] they have ranged against them the Southerners who are called Bourbons.
Marcus et al. (1999, cg01.pos)

2.2 The Distribution of C1

The previous sections have established that at least two distinct mechanisms are responsible for the phenomenon of unbalanced discontinuous coordinations: left- and right-displacement of C1 on the one hand (whether due to movement or to licensing under locality restrictions) and Conjunction Reduction in the second conjunct on the other hand. §2.2.2-2.2.4 discuss in more detail the constraints on these three mechanisms and show that they are all sensitive to the same types of syntactic structure: multiple finite tenses, islands, and negation.

2.2.1 Focus

As demonstrated by Schwarz (1999); Hendriks (2004), and den Dikken (2006), among others, the distribution of both, either, and neither depends on the focus properties of the coordinated clauses. I have nothing to add to these proposals, and will instead focus on the purely syntactic constraints on the distribution of C1.

2.2.2 Locality Constraints on Left-Displacement

The assumption that Conjunction Reduction only applies within DPs clearly demarcates the cases an adequate theory of long-distance dependencies of C1 must describe. An appropriate statement of the locality restrictions on these dependencies must account for any “extra” material that appears between C1 and the left edge of a DP (or whatever other category is being coordinated). The following sentences from Treebank\textsuperscript{17} demonstrate the range of possibilities, where intervening material is underlined:

\textsuperscript{17}I have noted cases in which some of these examples have alternative analyses. See Kaplan (2007) for a fuller discussion of how these examples were extracted and analyzed.
(49) a. A
...the separated volumes are neither chronological [PP t_i [PP within themselves ] nor [PP in relation to each other ] ]
Marcus et al. (1999, cj65.pos)
b. P
...he could more quickly provide Miriam with a suitable home either in [DP t_i [DP Los Angeles ] or [DP Paris ] ], as she preferred.
Marcus et al. (1999, cg32.pos)
c. V
The discontinuity can either be [DP t_i [DP that of war to destruction, ] or [DP that of diplomatic policy ] ]
Marcus et al. (1999, cb20.pos)
d. V, P
Have you ever gotten one of those calls that is either generated by [DP t_i [DP a computer ] or [DP somebody going down a list ] ] ....
Marcus et al. (1999, sw2015.pos)\(^\text{18}\)
e. V, V
...she could either have taken [DP t_i [DP tennis, ] or [DP weight lifting ] ] ....
Marcus et al. (1999, sw2383.pos)
f. V, I
...the administration will either have to [VP t_i [VP cut down expenses ] or [VP inflate its estimates of anticipated revenues ] ]
Marcus et al. (1999, ca08.pos)
g. V, I, V
You’d be, you’d either have to be [PredP t_i [PredP in a cave not to know what’s going on, ] or [PredP moving it to Lubbock ] ]
Marcus et al. (1999, sw2025.pos)
h. V, I, V, P
I either want to do it in [DP t_i [DP the fall ] or [DP the spring ] ]
Marcus et al. (1999, sw2248.pos)
i. DP
“All life is about change – either you [I t_i [I adapt ] or [I die ] ] ,” says one Chicago futures trader.
Marcus et al. (1999, wsj_0742.pos)
j. V, DP, S(mall)C(lause)
So, uh, it takes a lot of work to either get everybody [VP t_i [VP called ] or [VP written ] ] and settle on a date, you know.
Marcus et al. (1999, sw2963.pos)
k. DP, I, V
Either you have, uh, [DP t_i [DP military service ] or [DP some sort of alternative,

\(^{18}\)This example might have originally involved coordination of generated by a computer and somebody going down a list. However, the analysis indicated is also clearly grammatical.
nonmilitary service | | ....
Marcus et al. (1999, sw4603.pos)

1. IP
...either, they’re doing it $[_{CP} \, t_i \, [_{CP} \text{ because they’re afraid they might become a state and want to declare this before they become a state, } ] \text{ or } [_{CP} \text{ maybe they don’t want to become a state for fear of losing the Spanish, or Hispanic heritage } ] \]$. 
Marcus et al. (1999, sw2040.pos)

m. C, DP, I, V
And, uh, either, if it’s $[_{DP} \, t_i \, [_{DP} \text{ a drum } ] \text{ or, or } [_{DP} \text{ disc brakes, } ] \] \] I enjoy working on those kind of things.
Marcus et al. (1999, sw3383.pos)

The examples reveal a wide range of long-distance dependency configurations for C1. Conspicuously absent are examples that violate one of the following three conditions:

1. **No more than one finite I may separate C1 from the left edge of the first coordinate.**

   (Similar observations have been made in Lechner (2001, 695-696), Larson (1985, 222), and den Dikken (2006, 713).) There is no example in the Treebank corpus of more than one finite I intervening between C1 and the left edge of the first coordinate. Sentences quickly become degraded when this occurs:

   (50) * Either, Harvey realized that Victor played $[_{DP} \, t_i \, [_{DP} \text{ a waltz } ] \text{ or } [_{DP} \text{ a polka } ] \]$. 

   On the other hand, a dependency relation across multiple nonfinite verbs is allowed, as shown in examples (49e), (49g), and (49h).

2. **The material between C1 and the left edge of the first coordinate may not include sentential negation.**

   To the extent that a sentence like (51) is grammatical, it does not have the intended meaning.

   (51) * Either, Harvey doesn’t like $[_{DP} \, t_i \, [_{DP} \text{ jazz } ] \text{ or } [_{DP} \text{ polka } ] \]$. 

   On a marginal reading that probably involves constituent negation of the verb, (51) can mean that either Harvey doesn’t like jazz or he doesn’t like polka (and the speaker may not be sure which is the case). What is unavailable is the intended reading of (51), in which Harvey likes neither – that is, the meaning of *Harvey doesn’t like either jazz or polka.*

---

19If *because*-clauses are actually PPs, examples like this could be subsumed under the pattern of (49b).
3. The material between C1 and the left edge of the first coordinate may not include an island boundary.

(Similar observations have been made in Larson (1985, 239) and Schwarz (1999, 363).) On the movement account of left-displaced C1 outside DPs, this restriction falls out immediately; otherwise, it must be stated explicitly.

(52) * Either_i Harvey knows if people liked his \([_{\text{DP}} t_{i} [_{\text{DP}} \text{concert }] \) or \([_{\text{DP}} \text{CD }] \).

4. The material between C1 and the left edge of the first coordinate may not include a(n unpaired) DP boundary.

As has already been discussed, Conjunction Reduction seems to be the only option within DPs. However, it is important to understand “DP boundaries” in this context correctly. For example, I have adopted the assumption that when C1 participates in the coordination of a DP, it appears under (some segment of) the DP node:

\[
\text{(53)}
\]

(Whether the structure of (53) should actually be “flat”, as illustrated, or not is irrelevant to the present purposes.) When DPs are coordinated and yet C1 appears displaced to the left, C1 has certainly moved “out of” a DP in some sense:

\[
\text{(54)}
\]

The crucial difference seems to be that no DP boundary that is not part of the con-
stituent that $C_1$ is associated with may intervene.

Of course, $C_1$ may be displaced across an *entire* DP, as illustrated in examples like (49k). In these cases, there is no sense in which $C_1$ is “leaving” a DP.

### 2.2.3 Locality Constraints on Right-Displacement

Rightward movement is less well studied than leftward movement, and its status is dubious and uncertain. Even when appealed to, such movement (e.g., Heavy Shift, discussed in Ernst (2002)) is often assumed to be fundamentally different from leftward movement. If the movement account of these long-distance dependencies involving $C_1$ is correct, it is therefore not surprising that right-displacement of $C_1$ is more constrained than is left-displacement: of 1,283 instances of discontinuous coordination in the Treebank corpus, 150 involve left-displacement of $C_1$ and 69 involve right-displacement; the difference is significant ($p < 0.0003$). (In addition, of the 69 cases of right-displacement, fully 18 involve displacement of *either* across a subject, and another 23 involve displacement of *either* across a subject and a finite verb.)

But despite the lower frequency of rightward displacement, the constraints on long-distance dependencies involving $C_1$ do not seem to be qualitatively affected by whether $C_1$ appears to the left or to the right of its expected position. The following examples from Treebank illustrate the range of possibilities, where material that intervenes between $C_1$ and its expected position is **underlined**:

(55)  

a.  

P

There was no display [$PP \ t_i \ [PP \ of \ either_i \ works \ in \ progress \ ] \ or \ [PP \ of \ finished \ work \ ] \ ] .

Marcus et al. (1999, cl11.pos)

b.  

V

...I would feel very uncomfortable working with someone I knew was [$VP \ t_i \ [VP \ using \ either_i \ illegal \ drugs \ ] \ or \ [VP \ abusing \ alcohol \ ] \ ] ....

Marcus et al. (1999, sw3088.pos)

c.  

V, I

...you’ve got, uh, all kinds of people knocking on your door and, who [$VP \ t_i \ [VP \ want \ to, \ uh, \ either_i \ direct \ you \ to \ the \ right \ path \ ] \ or, \ or \ [VP \ want \ to, \ uh, \ sell \ you, \ uh, \ paper \ routes \ ] \ ] ....

Marcus et al. (1999, sw3441.pos)

d.  

I

Well, I know, the choice [$t_i \ [t_i \ to \ either_i \ work \ ] \ or \ [t_i \ to \ be \ a \ mother \ ] \ ] \ is probably pretty difficult....

Marcus et al. (1999, sw2476.pos)

e.  

I, V

Yeah, I know I heard Bush say that, you know, we [$t_i \ [t_i \ are \ either_i \ bottoming \ out \ ] \ or \ [t_i \ seem \ to \ be \ ] \ ] .

Marcus et al. (1999, sw2968.pos)
As was true of leftward displacement, rightward displacement of C1 does not seem to cross multiple finite tenses, does not cross DP boundaries (although it may cross entire DPs), and cannot include negation of island boundaries:

(56) * [IP \_i [IP Harvey doesn’t either_i like jazz ] or [IP he likes polka ] ] .

(57) **? Harvey knows [CP \_i [CP if either_i people liked his concert ] or [CP if the CD was better received ] ] .

The fact that left- and right-displacement of C1 are subject to the same syntactic constraints is further evidence that literal movement of C1 is not the best model for this phenomenon, as discussed in §2.1.5. Indeed, the relation that holds between the position of C1 and the left edge of the first conjunct seems to be surprisingly symmetric: regardless of which of the two positions is higher in the tree, the same kinds of syntactic material are forbidden from intervening. This characteristic lends support to methods of syntactic computation that are insensitive to “leftward/rightward” (or “upward/downward”) direction, such as the \( \theta \)-path of den Dikken (2006, 708) or the F-relatedness chains of Zwart (2001, 37-38). These proposals have in common a relation R1 that is defined as the transitive symmetric closure of some other syntactic relation R2 (such as \( \theta \)-role assignment or feature valuation): in other words, this relation R1 in terms of which certain syntactic phenomena are defined is indifferent to exactly how two given entities are related by R2 (e.g., which entity is the \( \theta \)-assigner), as long as they are related. Similarly, the grammaticality of a discontinuous coordination construction does not seem to depend on whether it is C1 or the left edge of the first conjunct that is higher in the tree: the same locality conditions hold either way.

---

20Note that sentences like this contradict the claim of Larson (1985, 235-236) that IPs with right-displaced either require coreferential subjects.
2.2.4 Locality Constraints on Conjunction Reduction

Like long-distance dependency, Conjunction Reduction may not eliminate a string of material that crosses an island boundary:

(58)  
   a. Complex NPs
       *He denied [DP both [DP the rumors that he was lip-syncing] and [DP the rumors that he was going into rehab]].
   b. Relative Clauses
       *He is grateful to [DP both [DP the craftsmen who made his trombone] and [DP the craftsmen who made his accordion]].
   c. Wh-Clauses
       *He is expecting [DP both [DP news of whether people liked his concert] and [DP news of whether people liked his CD]].

Hankamer (1979) in fact shows that there is an entire class of ellipsis processes that obey island constraints:

(59)  
   a. “Stripping” (Hankamer 1979, 396)
       What’s Hasan writing?
       ...*the fact that a letter is obvious.
   b. “Wrong” (Hankamer 1979, 398)
       Did Harvey find the anaconda?
       ...*That the eggplant is obvious.
   c. “Not If” (Hankamer 1979, 399)
       *Sex is not a sin – that not if you enjoy it is clear.

Similarly, Merchant (2006) notes the sensitivity of ellipsis in certain comparative constructions to syntactic islands, although Merchant relates this sensitivity not to the ellipsis itself but rather to associated movement operations.

Unfortunately, it is not possible to test whether Conjunction Reduction is sensitive to multiple finite tenses or to sentential negation, as it is impossible to construct a DP that contains one of these types of structures that does not also contain an island.

2.2.5 Differences between Both and Either

The distribution of C1 is restricted not just by the syntactic configurations in which it appears but also by the identity of C1 itself. In English, both is more restricted than either, both quantitatively and qualitatively.

The quantitative differences between both and either, as represented by their frequency in the Treebank corpus, are shown in table 1, where the percentages given are the proportion of examples with a given C1 (both, either, or neither) that occur in a given position (the expected position or displaced to the right or left).
Displaced C1, whether to the left or to the right, occurs in 26.2% of the discontinuous coordinations involving *either*, but only 13.0% of those involving *both*; this difference is significant ($p < .0003$). The difference is mostly due to the more frequent right-displacement of *either*, which occurs in 12.7% of examples with *either*, as opposed to only 1.2% of examples with *both*. It is also the case that proportionally more instances of *either* were left-displaced than instances of *both* (13.5% vs. 11.8%), but this difference is not significant ($p = .1977$).

The tables below break down the distribution of discontinuous coordinations in Treebank by category. Each table summarizes the instances of discontinuous coordination in which C2 is followed by a particular syntactic category. This category is not necessarily the one that is syntactically coordinated in a given sentence, given the operation of Conjunction Reduction in DPs; thus, for example, the examples in table 2, in which C2 is followed by an NP, are actually cases of DP-coordination. (This system is an artefact of the atheoretical way in which the data were originally classified. See Kaplan (2007) for a more detailed description of how these data were collected.)

Table 1: Total Counts by C1 Type and Position

<table>
<thead>
<tr>
<th></th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Placement</td>
<td>596 (87.0%)</td>
<td>350 (73.8%)</td>
<td>118 (95.2%)</td>
<td>1064</td>
</tr>
<tr>
<td>Left-Displacement</td>
<td>81 (11.8%)</td>
<td>64 (13.5%)</td>
<td>5 (4.0%)</td>
<td>150</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>8 (1.2%)</td>
<td>60 (12.7%)</td>
<td>1 (0.8%)</td>
<td>69</td>
</tr>
<tr>
<td>Total</td>
<td>685</td>
<td>474</td>
<td>124</td>
<td>1283</td>
</tr>
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</table>

Table 2: Counts for Pre-NP Environment

<table>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Placement</td>
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<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Left-Displacement</td>
<td>52 (100.0%)</td>
<td>19 (100.0%)</td>
<td>0 (0.0%)</td>
<td>71</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>19</td>
<td>0</td>
<td>71</td>
</tr>
</tbody>
</table>

Table 3: Counts for Pre-DP Environment

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<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected Placement</td>
<td>431 (94.5%)</td>
<td>146 (83.4%)</td>
<td>73 (94.8%)</td>
<td>650</td>
</tr>
<tr>
<td>Left-Displacement</td>
<td>24 (5.3%)</td>
<td>28 (16.0%)</td>
<td>4 (5.2%)</td>
<td>56</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>1 (0.2%)</td>
<td>1 (0.6%)</td>
<td>0 (0.0%)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>456</td>
<td>175</td>
<td>77</td>
<td>708</td>
</tr>
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</table>

Table 4: Counts for Pre-AP Environment

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<td>Total</td>
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<td>------</td>
<td>--------</td>
<td>---------</td>
<td>-------</td>
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<tr>
<td>Left-Displacement</td>
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<td>0 (0.0%)</td>
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<tr>
<td>Right-Displacement</td>
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<td>0 (0.0%)</td>
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<tr>
<td>Total</td>
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Table 5: Counts for Pre-DegP Environment

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<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-Displacement</td>
<td>0 (0.0%)</td>
<td>4 (80.0%)</td>
<td>3 (100.0%)</td>
<td>7</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>0 (0.0%)</td>
<td>1 (20.0%)</td>
<td>0 (0.0%)</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 6: Counts for Pre-AdvP Environment

<table>
<thead>
<tr>
<th>Expected Placement</th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-Displacement</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>13</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 7: Counts for Pre-PP Environment

<table>
<thead>
<tr>
<th>Expected Placement</th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-Displacement</td>
<td>4 (5.4%)</td>
<td>2 (3.8%)</td>
<td>1 (20.0%)</td>
<td>7</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>6 (8.1%)</td>
<td>3 (5.8%)</td>
<td>0 (0.0%)</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>52</td>
<td>0</td>
<td>131</td>
</tr>
</tbody>
</table>

Table 8: Counts for Pre-VP Environment

<table>
<thead>
<tr>
<th>Expected Placement</th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-Displacement</td>
<td>1 (7.1%)</td>
<td>12 (14.0%)</td>
<td>0 (0.0%)</td>
<td>13</td>
</tr>
<tr>
<td>Right-Displacement</td>
<td>0 (0.0%)</td>
<td>5 (5.8%)</td>
<td>0 (0.0%)</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>86</td>
<td>17</td>
<td>117</td>
</tr>
</tbody>
</table>

Table 9: Counts for Pre-Ī Environment
<table>
<thead>
<tr>
<th></th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Placement</strong></td>
<td>1 (50.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Left-Displacement</strong></td>
<td>0 (0.0%)</td>
<td>1 (20.0%)</td>
<td>0 (0.0%)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Right-Displacement</strong></td>
<td>1 (50.0%)</td>
<td>4 (80.0%)</td>
<td>0 (0.0%)</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 10: Counts for Pre-IP Environment

<table>
<thead>
<tr>
<th></th>
<th>Both</th>
<th>Either</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected Placement</strong></td>
<td>1 (100.0%)</td>
<td>22 (32.8%)</td>
<td>0 (0.0%)</td>
<td>23</td>
</tr>
<tr>
<td><strong>Left-Displacement</strong></td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Right-Displacement</strong></td>
<td>0 (0.0%)</td>
<td>45 (67.2%)</td>
<td>1 (100.0%)</td>
<td>46</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1</td>
<td>67</td>
<td>0</td>
<td>69</td>
</tr>
</tbody>
</table>

Table 11: Counts for Pre-CP Environment

The most striking generalization that emerges is that *either* (especially if displaced) predominates in clausal contexts, including coordination of VP, Î, IP, and CP. In addition, there is only one instance of *both* apparently displaced to the left across a verb (finite or not):

(60) This has both made investors uneasy and the corporations more vulnerable. (Marcus et al. 1999, wsj.2376.pos)

It seems, then, that *both* is dispreferred (or prohibited outright) before verbal projections of various kinds (V, v, I, C). In addition, this dispreference is enforced at both the underlying and surface levels of representation: *both* does not appear preverbally even if it is associated with coordinated DPs, and coordination of VPs is not “rescued” if *both* is displaced to the right so that it is no longer preverbal on the surface.

Similar facts are true of German, where the distribution of *sowohl...als auch...* (‘both...and...’) is similar to that of *entweder...oder...* (‘either...or...’), except that the former is prohibited from coordinating Î ((61)) or IP ((62))21:

---

21 The status of the clauses indicated in the following examples is uncertain; they might also be CPs. If this is the case, the point could be made for CPs rather than IPs.
(61)  a.  Entweder [Peter singt] oder [Peter tanzt].
     either sing-PRES.3.SG Peter or dance-PRES.3.SG
     ‘Peter either sings or dances.’
   b. *Sowohl [Peter singt] als auch [Peter tanzt].
     both sing-PRES.3.SG Peter and dance-PRES.3.SG
     ‘Peter both sings and dances.’

(62)  a. Entweder [IP hat Peter gesungen] oder [IP Maria hat
     either AUX.PRES.3.SG Peter sing-PSTPRT or Mary AUX.3.SG
     getanzt].
     dance-PSTPRT
     ‘Either Peter sang or Mary danced.’
   b. *Sowohl [IP hat Peter gesungen] als auch [IP Maria hat
     both AUX.PRES.3.SG Peter sing-PSTPRT and Mary AUX.3.SG
     getanzt].
     dance-PSTPRT
     ‘Peter sang and Mary danced.’

(The subject Peter appears post-verbally in these examples because German is a V2
language; the presence of entweder or sowohl initially precludes Peter in that position. Inci-
didentally, the fact that entweder and sowohl may serve as V2 satisfiers supports den Dikken’s
(2006) proposal that C1 particles are, syntactically speaking, phrases.) Sowohl is not even
permitted to surface initially if it is associated with coordinated DPs22((63)):

(63)  a. Entweder trinkt Peter [DP Kaffee] oder [DP Tee].
     either drink-PRES.3.SG Peter coffee or tea
     ‘Either Peter drinks coffee or tea.’
   b. *Sowohl trinkt Peter [DP Kaffee] als auch [DP Tee].
     both drink-PRES.3.SG Peter coffee and tea
     ‘Peter drinks both coffee and tea.’

Nor is coordination of IP with sowohl...als auch... redeemed if sowohl moves to the right of
the finite verb ((64)), although sowohl is otherwise permitted before participles ((65)):

(64)  a. [IP Peter hat entweder gesungen] oder [IP Maria
     Peter AUX.PRES.3.SG either sing-PSTPRT or Mary

22For reasons that are not clear to me, this configuration is allowed with sowohl...als auch when the
coordinated DPs are subjects, as in (i):

     either AUX.PRES.3.SG Peter or Mary sing-PSTPRT
     ‘Either Peter or Mary sang.’
     both AUX.PRES.3.SG Peter and Mary sing-PSTPRT
     ‘Both Peter and Mary sang.’

27
It is at this point that we must ask whether we are encountering constraints on the realization of discontinuous coordination that have as much to do with processing considerations as they do with strictly grammatical requirements. The observations above suggest that both in English (and sowohl in German) has an aversion to functional heads in the extended verbal projection that is realized at multiple levels of representation and (at least in English) sometimes as a preference rather than as a strict requirement of the grammar. To the extent that this is a grammatical fact, however, we must be prepared to build into the lexical entry for both the fact that it does not readily appear next to verbal functional heads.

Incidentally, attention to the way discontinuous coordination is processed might help us better understand the relationship between the position of C1 and the scope of coordination. Although it was demonstrated in §2.1.3 that the two are independent, it is possible that listeners prefer to assume that scope of coordination corresponds to the position of C1 if the latter is present (perhaps on the assumption that the speaker employed C1 precisely in order to mark scope). If an account along these lines is in fact correct, it might explain why scholars such as Larson (1985) have proposed that the two are actually connected.

3 Coordination and Scope

The discussion up to this point (e.g., §2.1.3) has assumed that the ambiguity of sentences like (66a) and (66b) has to do with the “scope” of coordination:

\[(66)\]

\begin{enumerate}
\item a. She handles requests for tickets and CDs.
\item b. She handles requests for tickets or CDs.
\end{enumerate}

\begin{enumerate}
\item (66a) She handles requests for tickets and CDs.
\item (i) ‘She handles requests that deal with more than one type of merchandise simultaneously, namely those that are for both tickets and CDs.’
\item (ii) ‘She handles requests for tickets, and she also handles requests for CDs.’
\end{enumerate}

\begin{enumerate}
\item (66b) She handles requests for tickets or CDs.
\item (i) ‘She handles those (non-specific) requests that would be satisfied by any
member of the set consisting of tickets and CDs.'

(ii) ‘Either she handles requests for tickets or she handles requests for CDs, but I’m not sure which.’

These coordinated phrases are ambiguous in a way that is reminiscent of quantifier scope ambiguities (Gamut 1991, 178-184) or the de dicto/de re distinction (Kaplan 1968; Gamut 1991, 184-185). In the (i) interpretations above (the “low-scope” or “de dicto” interpretations), the relevant interpretation of the noun is the one that arises when, semantically speaking, coordination applies to the noun’s PP adjunct and the resulting meaning is then combined with that of the noun. In the (ii) interpretations (the “high-scope” or “de re” interpretations), the relevant interpretation of the noun is the one that arises when the meaning of the noun is combined with that of each of the parts of the coordinated adjunct separately, and the resulting meanings are then coordinated.

The goal of this section is to justify the treatment of these ambiguities as scope-related and to show that the full range of facts is best approximated by a Hamblin semantics for both conjunction and disjunction. §3.1 considers and rejects four alternative ways of dealing with these ambiguities; §3.2 shows that a Hamblin semantics is superior to any of the alternatives. §3.3 shows that the scope of coordination is sensitive to the same kinds of syntactic constraints as are movement and Conjunction Reduction.

3.1 Four Inadequate Accounts of the Scope of Coordination

3.1.1 Distributivity of Plurals

One response to these ambiguities might be to try to subsume them under an account of the “distributivity” of plurals along the lines of Landman (1989a,b) and Hoeksema (1988). Under this analysis, the different interpretations arise from different ways of interpreting a property when it is predicated of a plural entity. For example, in (66a), the relevant property is the property of pertaining to both tickets and CDs:

\[(\lambda x : x \in D.e.\text{for-tickets}(x) \land \text{for-CDs}(x))\]

The low-scope interpretation of (66a) would arise when the property in (67) is interpreted distributively: that is, when it is interpreted as applying to every member of the relevant group of requests. The high-scope interpretation would arise when the property in (67) is interpreted as applying collectively to the entire relevant group of requests. A conjoined property like (67) would then be said to hold collectively of a group if and only if every sub-property (here, for-tickets and for-CDs) applies to at least one member of the group\(^{23}\). The collective interpretation would then be true if some of the requests are for tickets and some are for CDs, even if there are no requests for both.

An account along these lines is appealing because coordination is known to distribute over other operators, such as modals (Alonso-Ovalle 2005). However, three facts suggest

\(^{23}\)Possibly with the additional requirement that every member of the group satisfy at least one of these sub-properties.
that this account cannot be the correct analysis of the ambiguity.

1. It is not clear how to extend this account to include the analogous facts from disjunction in (66b). The disjunctive analogue of (67), for example, would presumably be (68):

\[(68) \quad \lambda x : x \in D_e. \text{for-tickets}(x) \lor \text{for-CDs}(x)\]

If we try to apply (68) distributively to every member of the group of relevant requests, though, we get the result that every request has the property of being either for tickets or for CDs. This is not the interpretation we want, though; it is the “high-scope” collective interpretation. If, on the other hand, we say that the relevant property is one of requesting either tickets or CDs, it is not clear how to apply this property collectively to the group of requests as a whole.

2. The same ambiguity appears with non-nominal categories such as verbs:

\[(69) \quad \begin{align*}
a. & \text{Victor requested tickets and CDs.} \\
   & \quad \text{(i) ‘Victor made a single request in which he asked for both tickets and CDs.’} \\
   & \quad \text{(ii) ‘Victor requested tickets, and he also (separately, and possibly from someone else) requested CDs.’} \\
b. & \text{Victor requested tickets or CDs.} \\
   & \quad \text{(i) ‘Victor made a request for some type of merchandise, but specified that he didn’t care whether he received tickets or CDs.’} \\
   & \quad \text{(ii) ‘Either Victor requested tickets or he requested CDs, but I’m not sure which.’}
\end{align*}\]

In order for the distributivity/collectivity account to carry over here, it is necessary to have a theory of singularity and plurality of verbs, adjectives, prepositions, and just about every other syntactic category with intensional members. To extend plurality in this way, which is most clearly relevant to nouns, suggests a missed or mischaracterized generalization.

3. The same ambiguity applies even to singular nouns:

\[(70) \quad \text{(I was worried that Gertrude wouldn’t be able to take care of everything while our band’s business manager is on maternity leave. But the workload has been light and she’s done very well. In fact, just this morning we got two phone calls and she took care of both.)} \\
   \text{She handled both a request for tickets and CDs.}\]

Treebank provides examples as well:
The role of both church and university as sources of information and settings within which the implications of such information may be explored needs consideration. Marcus et al. (1999, cd12.pos) (two separate roles: that of church and that of university)

b. He is a member both of the National Academy of Sciences and of the American Philosophical Society; and he has served our country well as a scientific statesman on international commissions. Marcus et al. (1999, ch25.pos) (two separate memberships, one in each organization)

(70) and (71) suggest that it is not the plurality of the noun that drives this ambiguity.

The ambiguities of (66), then, cannot be reduced to an account of plurality; rather, they are driven by the coordination itself.

3.1.2 Conjunction Reduction

One of the original purposes of Conjunction Reduction (Lakoff and Peters 1969) was to derive the very sorts of ambiguities being considered here. We have already seen (in §2.1) that this account cannot be correct when structure outside of DPs is involved, as in the examples in (69). In addition, we have seen evidence (in §2.1.3) that even when it is DPs that are being coordinated, these ambiguities seem to be independent of the presence of the articulated structure entailed by Conjunction Reduction. Thus, while Conjunction Reduction may be part of the answer to the kind of ambiguity illustrated in (66), it cannot be the whole story.

3.1.3 Type-Shifting of Coordination

Rooth and Partee (1982) and Partee and Rooth (1983) propose an analysis of phenomena related to coordinate scope in which what are essentially high-scoping coordinations are given raised types. If we define coordination with and or or very generally, we can generate both raised types for high-scope interpretations and lower types for low-scope interpretations; this idea is illustrated in (72).

(72) A very general semantics for coordination (based on Partee and Rooth (1983, 363-364))

a. Definition of conjoinable types
   (i) \( \langle t \rangle \) is a conjoinable type.
   (ii) If \( \tau \) is a conjoinable type and \( \sigma \) is any type, then \( \langle \sigma, \tau \rangle \) is a conjoinable type.
   (iii) Nothing else is a conjoinable type.

b. Syntagmatic definition of conjunction and disjunction
   (i) \( [\alpha \text{ and } \beta] = [\alpha] \cap [\beta] \)
   (ii) \( [\alpha \text{ or } \beta] = [\alpha] \cup [\beta] \)
c. Definition of ⊓ and ⊔: Base case
If $\llbracket \alpha \rrbracket$ and $\llbracket \beta \rrbracket$ are of type $\langle t \rangle$, then
(i) $\llbracket \alpha \rrbracket \sqcap \llbracket \beta \rrbracket = \alpha \land \beta$ and
(ii) $\llbracket \alpha \rrbracket \sqcup \llbracket \beta \rrbracket = \alpha \lor \beta$.

d. Recursive definition of ⊓ and ⊔: “Low-scope” case
If $\llbracket \alpha \rrbracket$ and $\llbracket \beta \rrbracket$ are of conjoinable type $\langle \sigma, \tau \rangle$, then
(i) $\llbracket \alpha \rrbracket \sqcap \llbracket \beta \rrbracket = \lambda X : X \in D_{\langle \sigma, \tau \rangle}. X(\llbracket \alpha \rrbracket \sqcap \llbracket \beta \rrbracket)$ and
(ii) $\llbracket \alpha \rrbracket \sqcup \llbracket \beta \rrbracket = \lambda X : X \in D_{\langle \sigma, \tau \rangle}. X(\llbracket \alpha \rrbracket \sqcup \llbracket \beta \rrbracket)$.

e. Recursive definition of ⊓ and ⊔: “High-scope” case
If $\llbracket \alpha \rrbracket$ and $\llbracket \beta \rrbracket$ are of type $\sigma$ and $\langle \sigma, \tau \rangle$ is a conjoinable type, then
(i) $\llbracket \alpha \rrbracket \sqcap \llbracket \beta \rrbracket = \lambda X : X \in D_{\langle \sigma, \tau \rangle}. X(\llbracket \alpha \rrbracket \sqcap \llbracket \beta \rrbracket)$ and
(ii) $\llbracket \alpha \rrbracket \sqcup \llbracket \beta \rrbracket = \lambda X : X \in D_{\langle \sigma, \tau \rangle}. X(\llbracket \alpha \rrbracket \sqcup \llbracket \beta \rrbracket)$.

When $\alpha$ and $\beta$ are of a higher type than $\langle t \rangle$, (72) permits two distinct interpretations of the $\sqcap$ and $\sqcup$ operators. (72d), which applies $\alpha$ and $\beta$ separately to an argument, coordinates the results, and abstracts over the argument, gives us low-scope interpretations. (72e), on the other hand, abstracts over a variable that applies to $\alpha$ and $\beta$ separately, where the results of these separate function applications are coordinated; this gives us high-scope interpretations.

The optionality that is built in to (72) means that there is a choice at every interpretation of a constituent that contains one of the $\sqcap$ or $\sqcup$ operators: scope may go “high” or “low” in the next round of function application, modulo compatibility of the types involved. The result is that coordinate scope may go as high in the tree as it wants, and that it may “stop” at any arbitrary place in the tree. This should be enough to generate all of the readings that we are interested in.

Following is a sketch of how the account of coordinate scope in (72) plays out in some simple examples. I will assume a toy grammar with the following lexicon:

$\llbracket \text{Harvey} \rrbracket = \text{Harvey}$

$\llbracket \text{sing} \rrbracket = \lambda X : X \in D_e. \text{SING}(x)$

$\llbracket \text{dance} \rrbracket = \lambda X : X \in D_e. \text{DANCE}(x)$

$\llbracket \text{try to} \rrbracket = \lambda f : f \in D_{(e, t)}. \lambda x : x \in D_e. \text{TRY-TO-MAKE-TRUE}(x, f(x))$

(73) illustrates the derivation of the low-scope interpretation of Harvey tries to sing and dance.
Sing and dance is interpreted by (72d), yielding the property that is true of an individual if that individual both sings and dances. Tries to applies to this property, and the resulting low-scope interpretation passes all the way up the tree.

(74) illustrates the derivation of the high-scope interpretation of Harvey tries to sing and dance.

Sing and dance is interpreted by (72e), yielding a representation that abstracts over a function that applies to each of the disjuncts separately. This interpretation applies to tries to, and the result is a meaning in which conjunction scopes over the intensional verb try.
Where the Conjunction Reduction analysis generated too few interpretations with respect to scope of coordinate structures, the type-raising analysis generates too many. The general process in (72) is capable of producing any logically possible scope configuration with respect to any head, despite the fact that there are a number of heads over which coordination cannot scope. For example, neither disjunction nor conjunction scopes over negation:

(75) Harvey doesn’t sing or dance.
   a. ‘Harvey doesn’t sing, and he also doesn’t dance.’
   b. #'Either Harvey doesn’t sing or he doesn’t dance, but I’m not sure which.’

(76) Harvey doesn’t sing and dance.
   a. ‘Harvey doesn’t both sing and dance, but he might do just one of the two.’
   b. #'Harvey doesn’t sing, and he also doesn’t dance.’

Similarly, coordination does not scope out of more than one finite clause:

(77) Mary hopes Harvey tried to sing or dance.
   a. ‘Mary hopes that Harvey acted with the goal that his actions result in him having at least one property in the set that consists of singing and dancing.’
   b. ‘Mary hopes that Harvey either tried to sing or tried to dance.’
   c. #'Either Mary hopes Harvey tried to sing or she hopes Harvey tried to dance, but I’m not sure which.’

Scope of coordinate structures is not unrestricted; the approach sketched in (72) is far too general.

3.1.4 Type-Shifting of And and Or

Since the source of the scope ambiguities in question is in the coordination itself, perhaps the solution to the over-generality of the process in (72) is to be found in the lexicon by type-raising and or and including only those entries that correspond to attested scope configurations.

To begin, at least the following denotations of and and or, which correspond to the basic high- and low-scope readings we have been considering, are necessary:

(78) Low Scope
   a. \[ [\text{and}_1] = [\lambda f : f \in D_{(e,t)}.[\lambda g : g \in D_{(e,t)}.[\lambda x : x \in D_e. f(x) \land g(x)]] ] \]
   b. \[ [\text{or}_1] = [\lambda f : f \in D_{(e,t)}.[\lambda g : g \in D_{(e,t)}.[\lambda x : x \in D_e. f(x) \lor g(x)]] ] \]

(79) High Scope
   a. \[ [\text{and}_2] = [\lambda f : f \in D_{(e,t)}.[\lambda g : g \in D_{(e,t)}.[\lambda F : F \in D_{(e,t),(e,t)}.[\lambda x : x \in D_e.F(f)(x) \land F(g)(x)]] ] \]
   b. \[ [\text{or}_2] = [\lambda f : f \in D_{(e,t)}.[\lambda g : g \in D_{(e,t)}.[\lambda F : F \in D_{(e,t),(e,t)}.[\lambda x : x \in D_e.F(f)(x) \lor F(g)(x)]] ] \]
This represents some progress over the general type-raising analysis: and_{1,2} and or_{1,2} give us the low- and high-scope interpretations of ‘Harvey tries to sing and dance’ exactly as before, but lack of ‘and_{3}’ and ‘or_{3}’ prevents the ultra-high interpretation of (77).

However, problems still remain. First, as long as there is only one finite I, there seems to be no principled limit to how high and (and possibly or) can scope. In (80a), conjunction scopes over both authors and contributions (and therefore over from and by along the way); in (80b), disjunction scopes out of its PP adjunct and out of an IP, all the way to complaints.

(80) a. The magazine, edited by members of the Carleton department of English, includes contributions by authors from both within and beyond the Carleton community.
   Marcus et al. (1999), brown/ch/ch28.pos
b. Complaints as to what’s the matter with either their kids or the school system.
   Marcus et al. (1999), swbd/2/sw2407.pos

In fact, it would be surprising if there were a limit of, for example, three heads over which coordination could scope; languages don’t usually “count” in this way. For adjuncts, at least, we need a potentially infinite number of ands and ors, which suggests that a rule for generating high-scope readings rather than simple lexical listing was on the right track.

A more serious problem for the lexical approach is that there is no way to directly represent sensitivity to negation or tense. For example, suppose sentential negation is of type \langle\langle e,t \rangle, \langle e,t \rangle \rangle:

(81) $$[\text{doesn’t}] = [\lambda f : f \in D_{(e,t)}.[\lambda x : x \in D_e.f(x) = 0]]$$

This negation has the same type as tries to, and or_{2} will scope right through it:

(82) \[
\begin{align*}
\text{Harvey doesn’t sing or dance} \\
\text{SING(Harvey) = 0} & \sqcup \text{DANCE(Harvey) = 0}
\end{align*}
\]

Harvey

doesn’t sing or dance

\[\lambda : x \in D_e.\text{SING}(x) = 0\] \sqcup \[\lambda : x \in D_e.\text{DANCE}(x) = 0\]

doesn’t

sing or dance (by (72e))

\[\lambda f : f \in D_{\langle\langle (e,t),(e,t) \rangle \rangle}.f(\text{SING}) \sqcup f(\text{DANCE})\]

Of course, if negation and intensional verbs such as tries to are of different semantic types, there is no problem: we simply include in the lexicon those ands and ors that scope over
intensional verbs but not those that scope over negation. But this is exactly the point: we can only ensure that coordination is properly sensitive to negation (and tense) by ensuring, when we construct our grammar, that negation does not have the same type as any other operator over which coordination does scope. Scope of coordination is sensitive to syntactic distinctions, but type-raising is only able to make scope sensitive to semantic distinctions.

3.2 Hamblin Semantics

An alternative approach to coordination scope is suggested by what is known as “Hamblin semantics”. Hamblin (1973) proposes that questions denote sets of possible answers; the use of these “alternative-sets” has been extended to indefinites (Kratzer and Shimoyama 2002) and disjunction (Hulsey 2006; Alonso-Ovalle 2005) as well. Suppose that both and or induce alternative-sets where they are introduced:

(83) \{[\lambda x:x \in D_e.sing(x)], [\lambda x:x \in D_e.dance(x)], \land \}

Since I am using alternative-sets for both conjunction and disjunction, it is important to distinguish between sets induced by each type of coordination (for example, for determining whether a set is closed by universal or existential quantification). Here, I include “\land” and “\lor” in the alternative-sets as meta-language diacritics for marking sets induced by conjunction and disjunction, respectively. Since the position of this indicator in the set is important, it is possible that what is needed is not sets but rather ordered lists (this will also become important when we consider a Hamblin semantics for comparatives). Alternatively, and or could induce ordered pairs consisting of an alternative-set and an indicator of which conjunction induced that set. Note also that in order to integrate alternative-sets into a type-driven semantics along the lines of Heim and Kratzer (1998), it is necessary to distinguish between sets and non-sets in the type system; an example of how this might be done is given in Rawlins (2006).

Function application applies pointwise to each member of the alternative set until the set is closed by an operator. Tries to, for example, may apply pointwise to the set in (83):
Harvey tries to sing and dance
\{TRY-TO-MAKE-TRUE(Harvey, SING(Harvey)),
TRY-TO-MAKE-TRUE(Harvey, DANCE(Harvey)), \∧\}\n
Sets induced by and are closed via universal quantification: all members must yield truth when combined with the rest of the sentence. Sets induced by or, on the other hand, are closed via existential quantification: some member must yield truth when combined with the rest of the sentence. Closure of an alternative set may happen at the root level (in which case it corresponds to ordinary \∧ and \∨), or it may be triggered by an operator. To produce the low-scope interpretation of Harvey tries to sing and dance, tries to closes the set before it applies:
We now have the tools to express the fact that coordinate structures may not scope over certain operators: those that always scope over coordination, such as negation, are always accompanied by a lower closure operator. Similarly, we can say that finite tense is always accompanied by a closure operator immediately above it; thus, once coordination scopes over one tense, it is immediately closed and may not scope over another. This account of finite tense would also explain the fact that, when coordination does scope over a finite intensional verb, it does not seem to be able to scope any further, even over some nonfinite intensional operator:

\[(86)\] I expect Mary to say that Harvey tried to sing or dance.

a. ‘I expect Mary to say that Harvey acted with the goal that his actions result in him having at least one property in the set that consists of singing and dancing,’
b. ‘I expect Mary to say that Harvey either tried to sing or tried to dance.’
c. ‘I expect Mary to say one of two things: that Harvey tried to sing or that he tried to dance.’

The Hamblin account has technical consequences for the way the de se/de re distinction is implemented. In order to preserve the account of the absence of mixed de se/de re readings in clauses, it is necessary to ensure that the distinction is one that depends on the semantics of particular lexical items, not on some optionality with respect to how function application is carried out. Otherwise, in a sentences like (28), where he combines pointwise with will win the election and will marry Pamela Anderson, the former application could yield a de re
meaning and the latter a *de se* meaning, resulting in the kind of mixed *de se/de re* reading that is impossible here.

We are also now able to describe some other unusual behavior of *and* and *or*. When disjunction is embedded under negation, there is one way it can “scope up”: by “flipping” over negation and becoming a conjunction. (This is an analogue of DeMorgan’s Law: \(\neg(\phi \lor \psi) \Leftrightarrow (\neg\phi) \land (\neg\psi)\).)

(87) Mary heard Harvey doesn’t sing or dance.
   a. ‘Mary heard that Harvey lacks a certain property, namely the one of having at least one property in the set that consists of singing and dancing.’ (*low scope*)
   b. ‘Mary heard two things (possibly on different occasions): that Harvey doesn’t sing and that he doesn’t dance.’ (*scope “flipped” across negation*)

Conjunction cannot “flip” in this way.

(88) Mary heard that Harvey doesn’t sing and dance.
   a. ‘Mary heard that Harvey doesn’t simultaneously have both properties in the set that consists of singing and dancing.’ (*low scope*)
   b. ‘Mary heard that either Harvey doesn’t sing or Harvey doesn’t dance, but she wasn’t sure which.’ (*scope “flipped” across negation*)

The inability of conjunction to exhibit this behavior can be seen even in unembedded contexts; (89) is especially telling.

(89) # Harvey doesn’t sing and dance, but I’m not sure which.

We can express this with Hamblin alternative sets by defining negation in such a way that it can “switch” the identity of sets introduced by *or* and then pass them up the tree without closing them out; further, we must specify that negation does not do this with *and*. The definition in (90) allows \([\text{doesn’t}]\) to take a set introduced by *or* and produced the appropriately equivalent *and* set:

\[
\text{(90) } [\text{doesn’t}] = \lambda\{f, g, \lor\} : f, g \in D_{e,t} \cdot \{[\lambda x : x \in D_e . f(x) = 0], [\lambda x : x \in D_e . g(x) = 0], \land\}
\]

It can be difficult to tease apart “flipped” readings from meanings that are simply entailed by the low-scope reading; if Mary believes that Harvey doesn’t sing or dance, then naturally she believes that Harvey doesn’t sing and that Harvey doesn’t dance. In addition, things of course become more complicated when negation and disjunction are embedded under quotative verbs such as *scream*, which interact with pragmatic factors requiring faithful reporting. Even if some of the details are murky, though, the contrast between (87) and (88) is very clear.
Harvey doesn’t sing or dance
{¬SING(Harvey), ¬DANCE(Harvey), ∧}

Harvey

doesn’t sing or dance
{[λx:x∈De.¬SING(x)], [λx:x∈De.¬DANCE(x)], ∧}

doesn’t
{[λ{f, g, ∨}:f,g∈D_{(e,t)}.{[λx:x∈De. f(x) = 0], [λx:x∈De. g(x) = 0], ∧}] [λx:x∈De.¬DANCE(x)], ∨}

Thus, while not particularly elegant, Hamblin semantics allows us to account for the facts where Conjunction Reduction and type-raising failed.

Finally, this semantics can be extended to account for unbalanced comparatives as well. Given the structure in (37), it is possible to define more as an operator that closes out a set with two members of type ⟨d,⟨e,t⟩⟩, giving it the appropriate semantics (Rullmann 1995):

(92) \[ [\text{more}] = [\lambda\{R, Q, >\}:R,Q\in D_{(d,\langle e,t \rangle)}.[\lambda x.\exists d \text{ s.t. } R(d)(x) \wedge d > max([\lambda d' \in D_d. Q(d')(x)])]] \]

(As foreshadowed above, since the relative order of the members of the set that more operates on is important, this system may require an ordering relation to hold over at least some sets. Comparatives are not the only case in which the members of an alternative-set do not all have the same status; see Ladusaw (2003) for a discussion of biased questions.)

(93)
Harvey is more excited about jazz than polka

∃d s.t. \textsc{excited-about}(Harvey)(jazz)(d) ∧ d > 
max([\lambda d'. \textsc{excited-about}(Harvey)(polka)(d')])

This account correctly derives the fact that \textit{more}, since it is itself the operator that closes out the relevant alternative-sets, cannot be right-displaced on analogy with C1 (since it would be inside one of the alternatives and would have no way to operate on the set):

(94) * Harvey \[\text{VP} \, t_i \, [\text{VP} \, \text{ate more}{_i} \, \text{oatmeal}] \, \text{than} \, [\text{VP} \, \text{cooked rice}] \].

(cf. (55b))

On the other hand, since \textit{both} and \textit{either} are independent of the operators that close out alternative-sets (because they are independent of the scope of coordination, as demonstrated in §2.1.3), there is no semantic obstacle to their right-displacement.

### 3.3 Syntactic Restrictions on Coordinate Scope

The list of syntactic configurations that block coordinate scope should be familiar from those that also characterized movement and ellipsis in discontinuous coordination. As noted above, coordination does not scope over more than one finite tense, nor does it scope over negation. Coordination also does not scope out of syntactic islands:
(95) Mary wonders if Harvey sang or danced.
   a. ‘Mary wonders whether it is the case that Harvey has at least one property in
      the set that consists of singing and dancing.’
   b. #’Either Mary wonders if Harvey sang or she wonders if he danced, but I’m not
      sure which.’

4 Conclusion and Prospects

We have seen that the full range of behavior of discontinuous coordination (and of coordi-
nation in general) requires reference to three distinct mechanisms: movement (or locality
restrictions on the surface position of some constituent), ellipsis, and Hamblin alternativ-
sets. Further, we have seen that all three of these mechanisms are sensitive to the same
kinds of syntactic structure: finite tense, negation, and islands. Although it is widely agreed
that movement is sensitive to these kinds of structure, we have seen evidence (in §2.1.5) that
the mechanism involved in the displacement of C1 in clauses is not actually movement at
all; in addition, we have seen that neither ellipsis nor Hamblin semantics can be reduced to
a movement-based account. Sensitivity of some phenomenon to these types of structures,
then, cannot be taken as conclusive evidence that the phenomenon is the result of movement;
movement is not alone in displaying the kind of syntactic sensitivity that characterizes so
many corners of natural language.

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